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REAPPRAISAL OF TWO PLUMOSE RHYNCHOSPORAS OF THE SOUTHEASTERN UNITED STATES

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Rhynchospora, Section Eurhynchospora, in Canada, the United States and the West Indies, was treated taxonomically by Gale (RHODORA **46**: 89-278.) in 1944. According to this revision, Series Plumosae consists of three species: *R. plumosa* Ell., *R. intermedia* (Chapm.) Britt. and *R. oligantha* Gray, all characterized by the possession of unique perianth bristles. *Rhynchospora oligantha* var. *breviseta* Gale was originally described in this work.

This new variety was distinguished from *R. oligantha* var. *oligantha* (as var. *typica*) by the reduced condition of the perianth bristles to less than one-half the length of the achene, the ovoid shape and smaller size of the achene and the short-conic tubercle. At this time the ranges of the two varieties were considered to be mutually exclusive: var. *oligantha* was reported to occur along the Atlantic and Gulf Coastal Plain from New Jersey southward into Georgia and western Florida, thence westward into eastern Texas (and also in Central America); var. *breviseta* was reported from peninsular Florida, western Cuba, Jamaica and Hispaniola.

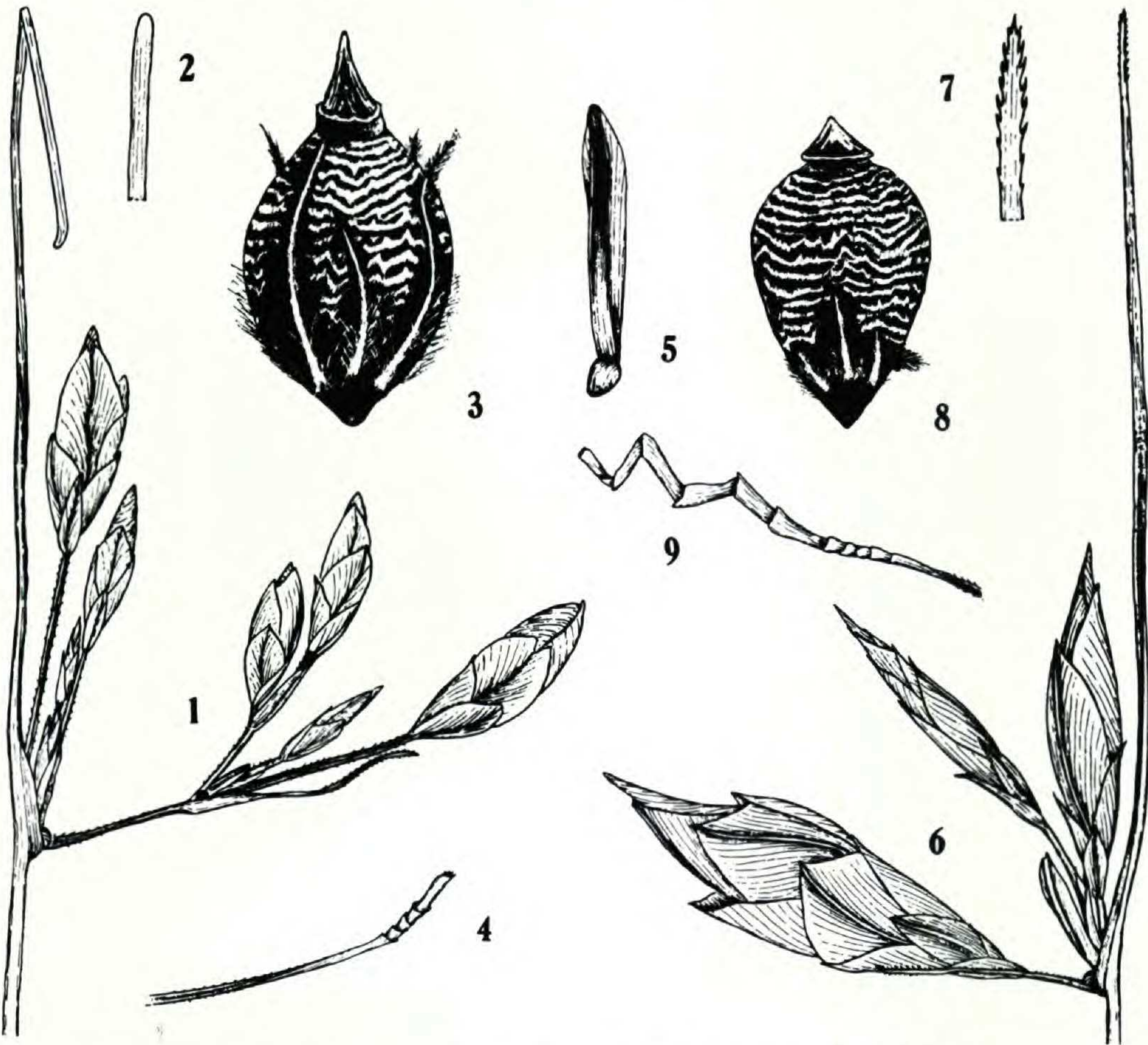
In the treatment of the same group (Sect. Plumosae), Kükenth. (Bot. Jahrb. **74**: 505-509. 1949.) recognized three species also. However, only two of these had been recognized as such by Gale. Accordingly, *Rhynchospora intermedia* was reduced to varietal status under *R. plumosa*, where, in addition, the new variety *interrupta* Kükenth. appeared. The plumose-

bristled *R. diadon* (Nees) Griseb. (*R. lunata* Griseb.), in effect excluded by Gale from *Eurhynchospora* largely on account of its "curious horned tubercle" (cf. RHODORA 46: 95. 1944.), was re-instated in the Plumosae. *Rhynchospora oligantha* var. *oligantha* and var. *brevisetata*, however, were maintained without change of status or extension of range.

Material collected since the appearance of Gale's monograph and which was not utilized by Kükenthal reveals that *Rhynchospora oligantha* var. *brevisetata* is not only morphologically quite distinct, but that its geographical range is sympatric with that of the typical variety over a considerable area. In some areas, in fact, the two are known to occur side by side in the field and, although apparently flowering and fruiting over the same general period, maintain their distinctive morphological features without any indication of intergradation. This evidence, presented in detail below, is considered to be of sufficient magnitude to require the elevation of var. *brevisetata* to specific status. The following change of status is thus made: ***Rhynchospora breviseta*** (Gale) stat. nov. based on *Rhynchospora oligantha* A. Gray var. *brevisetata* Gale, RHODORA 46: 129, 130. 1944.

The close relationship of *Rhynchospora breviseta* and *R. oligantha* is not questioned. The two species have in common the rugulose achenes, plumose perianth bristles, filiform leaves and culms and the cespitose habit of Series Plumosae. In addition, they have both axillary and terminal inflorescences of 1-several pedicellate spikelets, the inflorescences being both pedunculate and sessile and the spikelets disposed singly or as decomposed fascicles. Both species are perennial by means of short, firm or ligneous, somewhat bulbous, crown-like rhizomes. The lowermost leaves consist of closed, truncate sheaths which may or may not bear short, greatly reduced blades. The typical cauline leaf is comprised of a closed, slenderly cylindrical sheath, truncate at the apex, and a long, linear blade about $\frac{1}{2}$ or $\frac{1}{3}$ the width of the sheath. The blades are more or less concave or channeled throughout the serrulate basal portion and subterete or obtusely 4-angled and entire above.

The leaf tips differ according to the species: *R. oligantha* (Fig. 2) has entire, blunt-tipped leaves; *R. breviseta* (Fig. 7)



RHYNCHOSPORA OLIGANTHA (Channell 3120): Fig. 1, terminal inflorescence $\times 4$; Fig. 2, leaf tip $\times 12$; Fig. 3, achene $\times 12$; Fig. 4, rachis $\times 4$. R. BREVISETA (Channell 3257): Fig. 5, prophyll $\times 8$; Fig. 6, terminal inflorescence $\times 4$; Fig. 7, leaf tip $\times 12$; Fig. 8, achene $\times 12$; Fig. 9, rachis $\times 4$. (Drawings kindly prepared by Ding Hou.)

has acute tips which are minutely serrulate on the margin. These differences have been previously overlooked. While generally representing a practical taxonomic character, it should be pointed out that the serrulations of the leaf tips of *R. breviseta* are so minute that they are sometimes obscured in herbarium material which has been prepared by gluing the specimens to the sheets. The glue acts to seal these minute teeth against the margin of the leaf causing the margin to appear entire or otherwise rendering the serrulations somewhat transparent and thus difficult to observe.

The achenes of *Rhynchospora oligantha* and *R. breviseta* are more nearly lenticular than those of the other members of Series Plumosae. Despite this general similarity, however,

the two species are remarkably distinctive on the basis of other achenial features. The achene of *R. oligantha* (Fig. 3) is broadly elliptic and has a conspicuous collar-like constriction at the apex, the upper flange of which surrounds the base of the conic-attenuate tubercle. The achene of *R. breviseta* (Fig. 8) is ovoid or obovoid in shape and is crowned by a depressed-conic tubercle giving the appearance of having been applied to the apex of the achene. Indeed, the achenial differences are so pronounced that there is little chance of confusing the two species on that basis alone.

The achenes of both species have been observed occasionally to be covered with a whitish, waxy bloom, although this is by no means a general feature of herbarium material. This pruinose condition is very conspicuous in freshly collected specimens but may disappear in the process of drying the specimens, especially if artificial heat is employed. There is considerable variation in the color of the achenes, this apparently varying to a certain extent with the degree of maturation attained. In individual spikelets of *R. breviseta*, which are oftentimes 8-fruited, the achenes may vary in color from manila-buff in the terminal portion of the spikelet, to castaneous in the central portion and, finally, dark blue or bluish black in the basal portion. The achenes are usually promptly shed at maturity; thus the dark-colored achenes are not often to be seen on herbarium sheets.

As the epithet connotes, the plumose perianth bristles of *Rhynchospora breviseta* are considerably shorter than those of *R. oligantha*. In the latter species the bristles vary from $\frac{1}{2}$ the length of the achene to slightly longer than the achene, the basal portion being heavily plumose and the tips antrorsely serrulate; in the former the bristles are less than $\frac{1}{2}$ the length of the achene and usually lack the antrorsely serrulate tips so pronounced in *R. oligantha* and are occasionally reduced to mere plumose tufts.

While there is a decided difference between *Rhynchospora breviseta* and *R. oligantha* in the size and shape of the spikelets where best developed, the considerable variation throughout the geographical ranges of the two species precludes the use of these as diagnostic characters. Nevertheless, the spikelets

of *R. breviseta* (Fig. 6) are, in general, longer and more slenderly fusiform in shape, the surface of the spikelet being somewhat torulose due to the arrangement of the 3–8 achenes in a scarcely imbricate, spiral series along the sides of the anfractuose rachis. This spirally zigzag, somewhat winged rachis is a conspicuous feature of *R. breviseta* (Fig. 9) even after the achenes are shed. Varying from 5 to 8(–10) mm. in length, the rachis remains intact well after the shedding of the spikelet scales and the achenes, even though it is a weakly organized, brittle structure which breaks easily under mechanical stress. The spikelets of *R. oligantha* (Fig. 1) are usually only 1–2(–3)-fruited, terete and relatively smooth, with little or no tendency to be torulose. The rachis (Fig. 4) is generally short and straight, somewhat clavate, 1–2(–3) mm. in length and without evident wings.

The following key summarizes the numerous differences between the two species:

- Achene elliptic, broadest near the middle, the apex constricted into conspicuous collar-like flange; tubercle conic-attenuate, arising out of the surrounding collar, not contracted at the base; perianth bristles exceeding one-half the length of the achene; spikelets few-flowered, 1–3-fruited, the rachis with short, congested internodes; divergent lower branch of well-developed inflorescence commonly bearing a secondary branch, each with a pulvinate bract in the axil; leaf tips obtuse, entire. *R. oligantha*.
- Achene obovoid, broadest above the middle, the apex without a conspicuous collar-like flange; tubercle depressed-conic, abruptly contracted at the base; perianth bristles one-half the length of the achene or shorter; spikelets several-flowered, 3–8-fruited, the rachis anfractuose-elongate, the internodes produced between the achenes; divergent lower branch of well-developed inflorescence usually simple, thus with only one pulvinate bract; leaf tips acute or acuminate, minutely serrulate. *R. breviseta*.

The collections of *Rhynchospora breviseta* cited below are in addition to those included by Gale and Kükenthal. NORTH CAROLINA: Brunswick County, *Wood & Clement 7063* (DUKE, GH); Craven County, *Wood & Clement 6997* (GH). MISSISSIPPI: Jackson County, *Channell 3208, 3257 & 3663* (GH, duplicates to be distributed).

Rhynchospora breviseta was not previously known to occur in the United States outside of Florida, and these collections extend the range of the species northward into North Carolina

and westward into Mississippi, well into the range of *R. oligantha* in both directions. It is a significant fact that the writer's number 3257 originally comprised a large collection of a mixture of *R. breviseta* and *R. oligantha*. Material of the latter species was segregated only after examination in the laboratory to comprise his number 3258. This information is presented as unequivocal evidence that the two species occur together in the field, at least in Jackson County, Mississippi.

Even though an inconspicuous element in the flora, without doubt having generally been passed unnoticed, *Rhynchospora breviseta* is to be expected to occur elsewhere on the Atlantic and Gulf Coastal Plain. Future collecting is likely to result in the discovery of the species over an even wider range as well as in areas between those already reported.

Differences in the structure of the inflorescences of *Rhynchospora oligantha* and *R. breviseta* mentioned in the preceding key apparently have been generally overlooked. Except in terms of general form, in fact, the details of inflorescence structure appear nowhere in the genus to have been adequately described. The remainder of this paper is therefore devoted to the description and comparison of the inflorescences of these and related species. In terms of relating species and species groups it would appear that the inflorescence may yield characters which could serve to supplement those of the fruit upon which the taxonomy of the entire genus has been thus far so singularly dependent.

Although of the same fundamental structure, both lateral and terminal inflorescences are produced by the two species in question. Both types are clearly reduced forms of a more extensive and open prototype, as suggested by a comparison with the inflorescences of other species. In addition, *Rhynchospora oligantha* and *R. breviseta* themselves exhibit in a variety of stages a remarkable reduction series. This series strongly suggests the course of the reduction process. In general, the inflorescences of *R. breviseta* (Fig. 6) have undergone reduction to a greater degree than those of *R. oligantha* (Fig. 1) and the two species can usually be distinguished on this basis.

The lateral inflorescences (not figured) are borne on long, flattened, upwardly serrulate peduncles arising singly out of

the closed leaf-sheaths of the mid and lower culm. In their simplest form these consist of a single ebracteate or bracteate spikelet. Frequently, however, the lateral inflorescences are compound and consist of fascicles of pedicellate spikelets. In such cases each fascicle is subtended by a 1-nerved, somewhat vaginate, keeled bract, serrulate at the apex. In compound inflorescences each of the component pedicellate spikelets is, in turn, subtended by an additional (ultimate) bract of distinctly scarious texture (Fig. 5). These ultimate bracts would appear to correspond to the prophylls of grasses. Ranging in length from 3–5 mm., these thin, glabrous, ultimate bracts are more or less oblong in shape and have obtusish apices. Each is longitudinally 2-nerved, one nerve being located on each of the two keels of the convex back. The basal portion of the blade of each of these bracts ensheathes the pedicel it subtends. Structurally, the lateral inflorescences thus possess only two orders of bracts: those of the inflorescence fascicles and those of the individual pedicellate spikelets.

The terminal inflorescences differ from the lateral in being sessile, that is, in lacking a common peduncle. Thus each, regardless of the degree of branching, is brought into close proximity to the uppermost leaf. This leaf is regarded as the primary (lowermost) bract of the terminal inflorescence-system, although it is little modified as compared with ordinary cauline leaves. The sheath portion is open, distinctly vaginate and thin-margined; the blade portion is concave and, although not rendered in the accompanying drawings, is minutely serrulate on the margin at the base, becoming entire above and finally indistinguishable from typical leaves toward the tip. The retention by the primary bract of foliar features characteristic of ordinary leaves renders it easily distinguishable from the highly modified, distinctly keeled bracts which often subtend each fascicular unit of the inflorescence. Appearing to be a continuation of the culm, the primary bract is to each over-all terminal inflorescence-system morphologically comparable to the bract subtending each individual inflorescence-fascicle. The terminal inflorescences may thus possess bracts of three orders, as shown in Figure 1, the primary bract just described in addition to the two types described for and common to the lateral, axillary

inflorescences. Bracts of secondary order may sometimes be absent altogether.

In compound inflorescences the lower branch is commonly and characteristically lateral in position and bears a conspicuous tuberculate enlargement (Figs. 1 & 6) in its axil. This pulvinate structure is clearly related to the lateral position ultimately assumed by the lower branch, in growth or enlargement doubtless serving to expand the inflorescence. Of more or less callous tissue, this pouch-like process is morphologically appendicular, belonging to the ultimate bract (Fig. 5) (prophyll) of the inflorescence, that is, the bract immediately subtending the individual pedicellate spikelets. For each inflorescence, however, only (0-)1-2 of these bracts bear such a process. As clarified in the accompanying key, the two species in question usually differ in this respect: *Rhynchospora oligantha* often bears two such bracts to each of the more well-developed inflorescences; *R. breviseta* usually bears only one.

There is considerable variation among the inflorescences as to the degree of development, even in the same collection or individual clump. The most fully developed inflorescence is of a characteristically corymbiform type, the primary axes of which may be twice or thrice branched. In less well developed inflorescences the primary axes are simple, arranged in a sort of umbellate cluster. Due to the failure of certain spikelets to develop, there are often present more ultimate bracts (prophylls) per inflorescence-fascicle than spikelets, for the bract subtending each pedicel is oftentimes produced whether the spikelet develops or not. Those inflorescences in which only the lateral axis develops owe their unilateral form to the retention of an axillary bract bearing a tuberculate process at the base. Occasionally the axillary inflorescences are severely reduced, represented merely by a single pedicellate, ebracteate spikelet. This condition, however, is less common than the others described and is usually associated with a more basal position of the spikelet on the culm.

The inflorescences of *Rhynchospora oligantha* and *R. breviseta* are quite unlike the more congested, spiciform or glomerate inflorescences of *R. plumosa* (including var. *interrupta*) and *R. intermedia*, the two pairs of species usually being separable

in the field on this basis. This is due to the distinctly pedicellate nature of the spikelets of the former pair as contrasted with the sessile nature of the spikelets of the latter. Of the plumose-bristled Rhynchosporas, the inflorescences of *R. oligantha* and *R. breviseta* find their closest match in those of *R. diadon* which has only terminal inflorescences. Although more extensively branched and more floriferous, but in general more compactly corymbiform, the inflorescences of this species are nevertheless very similar to those of *R. oligantha* and *R. breviseta* in structural detail. The bracts associated with the inflorescence are of three orders, one of the ultimate, axillary bracts of each inflorescence-fascicle being dorsally spurred or pulvinate. The pattern of branching is identical and the lowermost branch of each inflorescence-fascicle assumes a lateral or divergent position. From this standpoint, therefore, the inflorescence of *R. diadon* suggests a logical prototype of *R. oligantha* and *R. breviseta*. The similarities in the structure of the inflorescences of these three species represent an additional correlative characteristic, not previously emphasized, which favors the retention of *R. diadon* in the Plumosae.

In fundamental details of structure and especially in general appearance, the inflorescences of *Rhynchospora oligantha* and *R. breviseta* are quite comparable to those of *R. rariflora* (Michx.) Ell., although the latter belongs to a different series (Rariflorae) which lacks plumose perianth bristles. In the field, therefore, it is often more difficult to distinguish *R. rariflora* from *R. oligantha* and *R. breviseta* than to distinguish the latter two species from *R. plumosa* and *R. intermedia*.—HARVARD UNIVERSITY, CAMBRIDGE, MASS.